

WHAT IS CLAIMED IS:

1. A powder delivery system for a laser-based additive manufacturing process, comprising:

a hopper adapted to contain a powder and continuously feed the powder through an output of the hopper;

a metering device adjacent the output of the hopper, the metering device adapted to receive the powder continuously fed through the output of the hopper; and

a powder removal device adjacent the metering device, the powder removal device operable to remove the powder from the metering device and deliver the powder to a nozzle of the laser-based additive manufacturing process.

2. The powder delivery system of Claim 1, wherein the metering device comprises a disk having a top surface adapted to receive the powder continuously fed through the output of the hopper.

3. The powder delivery system of Claim 1, wherein the metering device comprises a rotatable disk having a top surface that is substantially flat, the top surface adapted to receive the powder continuously fed through the output of the hopper, the top surface being disposed below the output of the hopper by a prescribed gap.

4. The powder delivery system of Claim 3, wherein the powder removal device is operable to remove the powder from the top surface.

5. The powder delivery system of Claim 4, wherein the powder removal device comprises a vacuum powder removal device operable to remove the powder from the top surface via a vacuum.

6. The powder delivery system of Claim 5, wherein the vacuum powder removal device comprises:

a chamber including a gas input orifice; and

a vacuum device disposed in the chamber, the vacuum device operable to remove the powder from the top surface by a flowing of a gas into the chamber through the gas input orifice and out of the chamber through the vacuum device.

7. The powder delivery system of Claim 3, further comprising a control device operable to vary an amount of the powder continuously fed to the metering device.

8. The powder delivery system of Claim 7, wherein the control device is further operable to vary the prescribed gap between the top surface and the output of the hopper.

9. The powder delivery system of Claim 7, wherein the control device is further operable to vary a speed of rotation of the rotatable disk.

10. The powder delivery system of Claim 7, wherein the control device is operable to vary a speed of rotation of the metering device and the prescribed gap between the metering device and the hopper.

11. A method of delivering a powder in a laser-based additive manufacturing process, comprising:

containing a powder in a hopper having an output;
continuously feeding the powder from the output to a metering device; and
removing the powder from the metering device with a powder removal device

12. The method of Claim 11, wherein continuously feeding the powder from the output to a metering device comprises continuously feeding the powder from the output to a top surface of a rotatable disk.

13. The method of Claim 12, wherein removing the powder from the metering device with a powder removal device comprises removing the powder from the top surface with a vacuum powder removal device.

14. The method of Claim 12, further comprising varying an amount of the powder continuously fed to the top surface.

15. The method of Claim 14, wherein varying the amount of the powder comprises varying a gap between the top surface and the output of the hopper.

16. The method of Claim 14, wherein varying the amount of the powder comprises varying a speed of rotation of the rotatable disk.

17. The method of Claim 14, wherein varying the amount of the powder comprises varying a gap between the top surface and the output of the hopper and varying a speed of rotation of the rotatable disk.

18. A powder delivery system for a laser-based additive manufacturing process, comprising:

a hopper adapted to contain a powder and continuously feed the powder through an output of the hopper;

a rotatable disk having a top surface that is substantially flat, the top surface adapted to receive the powder continuously fed through the output of the hopper, the top surface being disposed below the output of the hopper by a prescribed gap; and

a vacuum powder removal device operable to remove the powder from the top surface via a vacuum.

19. The powder delivery system of Claim 18, wherein the vacuum powder removal device comprises:

a chamber including a gas input orifice; and

a vacuum device disposed in the chamber, the vacuum device operable to remove the powder from the top surface by a flowing of a gas into the chamber through the gas input orifice and out of the chamber through the vacuum device.

20. The powder delivery system of Claim 18, further comprising a control device operable to vary an amount of the powder continuously fed to the metering device.

21. The powder delivery system of Claim 18, wherein the control device is further operable to vary the prescribed gap between the top surface and the output of the hopper.

22. The powder delivery system of Claim 18, wherein the control device is further operable to vary a speed of rotation of the rotatable disk.

23. The powder delivery system of Claim 18, wherein the control device is operable to vary a speed of rotation of the metering device and the prescribed gap between the metering device and the hopper.

24. A system of delivering a powder in a laser-based additive manufacturing process, comprising:

means for containing a powder;

means for continuously feeding the powder to a metering device; and

means for removing the powder from the metering device.